* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] the linear mode or the un-linear mode characterized by providing the following -- alternative -- it can operate -- the [and] -- the [the inside of 1 frequency band, or] -- the power amplification circuit for amplifying RF signal which can operate alternatively so that RF signal in 2 frequency bands may be amplified the [the 1st frequency band and] -- the [the 1st RF input terminal for receiving RF signal in 2 frequency bands, respectively, and] -- 2RF input terminal the [the 1st final amplifier and] -- 2 final amplifier The matching network which has an input edge, the outgoing end of a low band, and the outgoing end of a high band and by which this input edge is combined with the outgoing end of the aforementioned 1st final amplifier. the aforementioned amplifying circuit was made into the linear operating mode or the un-linear operating mode -- respectively -- answering -- the aforementioned 2nd RF input terminal -- the [the aforementioned 1st final amplifier and] -- switching network for combining with either of the 2 final amplifier alternatively Isolator combined between the high band outgoing end of the aforementioned matching network, and the 1st output line.
[Claim 2] The impedance-matching circuit combined with the outgoing end of the aforementioned 2nd final amplifier, The duplexer combined with the outgoing end of the aforementioned impedance-matching circuit, It is combined with the low band outgoing end of the aforementioned matching network, and the outgoing end of the aforementioned duplexer. When the aforementioned amplifying circuit is alternatively made into the linear mode or the un-linear mode, in order to combine alternatively one side of the outgoing end of the low band output of the aforementioned matching network, or the aforementioned duplexer with the 2nd output line, respectively, The power amplification circuit according to claim 1 which contains a switching circuit further.
[Claim 3] The power amplification circuit according to claim 2 which contains further the isolator combined between the low band outgoing end of the aforementioned matching network, and the aforementioned switching circuit.
[Claim 4] the [the aforementioned 1st output line and] -- the power amplification circuit according to claim 3 where 2 output line is combined with the diplexer
[Claim 5] The power amplification circuit according to claim 3 characterized by providing the following. the [the aforementioned 1st RF input terminal and] -- the [the 1st driver amplifier combined with 2RF input terminal, respectively, and] -- 2 driver amplifier -- further -- containing -- Node by which the aforementioned switching network was combined with the outgoing end of the aforementioned 2nd driver amplifier. The 1st switch combined between the input edges of the aforementioned 1st driver amplifier and the aforementioned 1st final amplifier. The 2nd switch combined between the aforementioned node and the aforementioned input edge of the aforementioned 1st final amplifier. The 3rd switch combined between the aforementioned node and the input edge of the aforementioned 2nd final amplifier.
[Claim 6] The power amplification circuit according to claim 5 which contains further the 2nd filter arranged between the 1st filter and the aforementioned 2nd driver amplifier which have been arranged between the aforementioned 1st driver amplifier and the 1st switch of the above, and the aforementioned node.

[Claim 7] Power amplifier according to claim 6 the 1st filter of the above and whose 2nd filter are surface acoustic wave filters.
[Claim 8] Power amplifier according to claim 2 which contains further the isolator combined between the aforementioned impedance-matching circuit and the aforementioned switching circuit.
[Claim 9] the linear mode or the un-linear mode characterized by providing the following -- alternative -- it can operate -- the [and] -- the [the inside of 1 frequency band, or] -- the power amplification circuit for amplifying RF signal which can operate alternatively so that RF signal in 2 frequency bands may be amplified the [the 1st frequency band and] -- the [the 1st RF input terminal for receiving RF signal in 2 frequency bands, respectively, and] -- 2RF input terminal the [the 1st driver amplifier and] -- 2 driver amplifier the [the aforementioned 1st driver amplifier and] -- the [the 1st final amplifier combined with 2 driver amplifier, respectively, and] -- 2 final amplifier matching network which has an input edge, the outgoing end of a low band, and the outgoing end of a high band and by which this input edge is combined with the outgoing end of the aforementioned 1st final amplifier the aforementioned amplifying circuit was made into the linear operating mode or the un-linear operating mode -- respectively -- answering -- the aforementioned 2nd RF input terminal -- the [the aforementioned 1st driver amplifier and] -- switching network for combining with either of the 2 driver amplifier alternatively
[Claim 10] The power amplification circuit according to claim 1 which contains further the isolator combined between the high band outgoing end of the aforementioned matching network, and the 1st output line.
[Claim 11] The impedance-matching circuit combined with the outgoing end of the aforementioned 2nd final amplifier, The duplexer combined with the outgoing end of the aforementioned impedance-matching circuit, It is combined with the low band outgoing end of the aforementioned matching circuit, and the outgoing end of the aforementioned duplexer. When the aforementioned amplifying circuit is alternatively made into the linear mode or the un-linear mode, in order to combine alternatively one side of the outgoing end of the low band output of the aforementioned matching network, or the aforementioned duplexer with the 2nd output line, respectively, The power amplification circuit according to claim 9 which contains a switching circuit further.
[Claim 12] The power amplification circuit according to claim 11 which contains further the isolator combined between the low band outgoing end of the aforementioned matching network, and the aforementioned switching circuit.
[Claim 13] the [the aforementioned 1st output line and] -- the power amplification circuit according to claim 12 where 2 output line is combined with the diplexer
[Claim 14] The power amplification circuit according to claim 12 characterized by providing the following. The node by which the aforementioned switching network was combined with the aforementioned 2nd RF input terminal. The 1st switch combined between the aforementioned 1st RF input terminal and the input edge of the aforementioned 1st driver amplifier. The 2nd switch combined between the aforementioned node and the aforementioned input edge of the aforementioned 1st driver amplifier. The 3rd switch combined between the aforementioned node and the input edge of the aforementioned 2nd driver amplifier.
[Claim 15] The power amplification circuit according to claim 14 which contains further the 2nd filter arranged between the 1st filter and the aforementioned 2nd RF input terminal which have been arranged between the aforementioned 1st RF input terminal and the 1st switch of the above, and the aforementioned node.
[Claim 16] Power amplifier according to claim 15 the 1st filter of the above and whose 2nd filter are surface acoustic wave filters.
[Claim 17] Power amplifier according to claim 10 which contains further the isolator combined between the aforementioned impedance-matching circuit and the aforementioned switching circuit.
[Claim 18] the linear mode or the un-linear mode characterized by providing the following -- alternative -- it can operate -- the [and] -- the [the inside of 1 frequency band, or] -- the

power amplification circuit for amplifying RF signal which can operate alternatively so that RF signal in 2 frequency bands may be amplified the [the 1st frequency band and] -- the [the 1st RF input terminal for receiving RF signal in 2 frequency bands, respectively, and] -- 2RF input terminal The 1st TDMA final amplifier combined with the aforementioned 1st RF input terminal. The 2nd TDMA final amplifier. Saturation amplifier Switching network for answering, respectively that the aforementioned amplifying circuit was made into the linear operating mode or the un-linear operating mode, and combining the aforementioned 2nd RF input terminal with either the aforementioned 2nd TDMA amplifier or the aforementioned saturation amplifier alternatively.
[Claim 19] The 1st isolator combined with the outgoing end of the aforementioned 1st TDMA amplifier The 2nd isolator combined with the outgoing end of the aforementioned 2nd TDMA amplifier Power amplifier according to claim 18 further equipped with the duplexer combined with the outgoing end of the aforementioned saturation amplifier.
[Claim 20] Power amplifier according to claim 19 which answers, respectively that the aforementioned amplifying circuit was made into TDMA mode or saturation mode, and contains further the switching circuit combined with the outgoing end of the 2nd isolator of the above for combining alternatively the aforementioned outgoing end of the aforementioned 2nd TDMA amplifier, or the aforementioned outgoing end of the aforementioned saturation amplifier with the 1st output line, and the outgoing end of the aforementioned duplexer.
[Claim 21] the TDMA mode or the un-linear mode characterized by providing the following -- alternative -- it can operate -- the [the inside of the 1st frequency band, or] -- the power amplification circuit for amplifying RF signal which can operate alternatively so that RF signal in 2 frequency bands may be amplified The switching network which has a high band input edge and a low band input edge. The driver amplification stage combined with the aforementioned switching network. TDMA amplifier and saturation amplifier.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
related application The U.S. patent application 08th under continuation to which it applied for this application on July 3, 1997 / 888, the U.S. patent application 08th for which it applied on No. 168 (surrogate reference number P08247-RMOT) and September 29, 1997 / No. 939,870 (surrogate reference number P08521-RMOT) -- it is continuation application a part -- The U.S. patent application 08th under continuation for which it applied on June 10, 1998 / 094, and 515 numbers (the [surrogate reference number] P09698-RMOT) are the things based on continuation application a part. Each aforementioned U.S. patent application is transferred to the applicant for this patent, and uses the above-mentioned U.S. patent application for as an example of reference.
[0002]
Background of invention Field of 1. invention Generally this invention relates to a detail more about power amplifier at the power amplifier of a dual band and a dual mode.
[0003]
2. Explanation of related technology In the U.S., cellular employment license has been given by Federal Communications Commission (FCC) according to the license plan to divide the U.S. into two or more geographical service markets. These cellular license was given to the radio frequency (RF) block in a 800MHz range of ** from the first. Almost all the 800MHz cellular phone system in the U.S. uses advanced mobile phone service (AMPS) analog radio interface specification. Then, a subsequent generation's radio interface specification over the 800MHz band known as D-AMPS is developed and realized. This D-AMPS specification includes the both sides of digital cellular communication and analog cellular communication. Therefore, the both sides of an analog (AMPS) cellular phone network and a digital (D-AMPS) cellular phone network are employed by 800MHz in the U.S. now.
[0004]
In order to respond to the increase in the demand to cellular service and to transmit voice, data, facsimile, and a text message digitally efficiently by the basis of a Personal Communication Service, i.e., PCS service, much digital radio interface specification was developed.
[0005]
In the U.S., it is GSM within a 1900MHz frequency range. A radio employment PCS system like the system based on TDMA (time-sharing multi-access) or IS-95CDMA (code division multi-access) radio interface specification is realized. Incidentally the 800MHz present cellular system is also still continuing being employed.
[0006]
Therefore, the analog and digital cellular system in 800MHz, and the digital PCS system in 1900MHz are applying in the U.S. now. It must choose whether the move subscriber who wants to receive service from the both sides of the system under employment by the system under employment and 1900MHz by 800MHz uses two different transceivers with the move transceiver which can be employed within cellular one, i.e., the move transceiver which can be employed within a 800MHz band and PCS, i.e., a 1900MHz band, or the single dual band move transceiver

which can transmit and receive RF signal within both frequency bands preferably uses. Furthermore, the move subscriber who wants to communicate using the both sides of an analog system and a digital system has to use a desirable single dual mode transceiver, using two different move transceivers. In order for a move transceiver to provide a user with the maximum flexibility and maximum functionality, a move transceiver is a dual mode and it is ideal for employment of a dual band to be possible.

[0007]

However, a problem produces the power amplifier used by the move transceiver in that it is made the optimal so that it can generally be used in a specific band (namely, PCS or AMPS) and the specific mode (an analog or digital). A problem produces especially this problem at two points of the point which applies bias to the point and amplifier of impedance matching.

[0008]

In order to make efficiency into the maximum, you have to match the impedance in the outgoing end of power amplifier with the impedance of the duplexer/diplexer before transmission (duplexer/diplexer). However, the impedance of a matching circuit changes with employment frequency. Therefore, it cannot be said that the conventional matching circuit made the optimal since the impedance of the amplifier in 800MHz is matched is generally matched the the best for the impedance of the same amplifier which operates by 1900MHz. Furthermore, the impedance of this amplifier changes according to an operating mode. Therefore, the conventional matching circuit made the optimal so that it might match with the impedance of the amplifier which operates by 800MHz in AMPS mode is not surely matched with the impedance of the same amplifier which operates by 800MHz in D-AMPS digital mode.

[0009]

Since the efficiency of amplifier changes according to the mode or class of an operation of amplifier determined by the modulation technique to be used, when applying bias, a problem arises. Generally, although well-known frequency-modulation (FM) technology is used in order that an analog communication system may modulate the analog information put on a carrier signal, another side and the digital communication system are using the digital modulation method, for example, a pai-fourth-Differential-QPSK (differential rectangular cross phase shift keying) modulation technique. The signal transmitted using frequency modulation operates by the non-linear, i.e., saturation mode, and is amplified at the highest efficiency by the power amplifier to which bias was applied. On the other hand, the signal transmitted using a pai-fourth-Differential-QPSK modulation operates in the linear mode, and is most efficiently amplified by the power amplifier to which bias was applied.

[0010]

One possible solution proposal to these problems is forming a separate amplifier chain, in order to employ the both sides of a high band (1900MHz) and a low band (800MHz), as shown in drawing 1 . However, this solution proposal is attached at an expensive price, and is redundant, and useless. Furthermore, low band amplifier still has a problem, when applying bias to low band amplifier, since the both sides of a digital signal and an analog signal must be amplified.

[0011]

One possible solution proposal to the problem of impedance matching in the transceiver which has a single amplifier chain is preparing the high path matching network separate to an outgoing end switched and low-pass matching network of amplifier. However, this switch must be able to process large power and has the inclination for the switch which large-sized costs require by this to be needed. However, matching in 800MHz surely turns into hybrid matching, and the efficiency in analog mode falls.

[0012]

Another solution proposal to the problem of impedance matching is preparing the broadband power matching circuit which covers the both sides of a frequency band which wish and has a peak in a transmitting band. According to this structure, although there is an inclination for a bandwidth to become useless, one or more octaves of matching frequency to wish differ, and the bandwidth in each band for which it asks becomes comparatively narrow. It is shown that the marginal principle (Fano's Limit) of FANO has a physical limitation in broadband matching in case

a reactive element (for example, capacity between the drain-sources of a transistor) exists.

[0013]

Although the conventional solution proposal to the problem of impedance matching in the transceiver which has a single amplifier chain has solved the problem of bias by preparing separate bias level, the problem of impedance matching still remains. When using single amplifier for amplifying the both sides of an analog signal and a digital signal, you have to apply bias to amplifier, maintaining analog efficiency as highly as possible so that the conditions of linearity may be fulfilled rough. There is an inclination which becomes inefficient-like according to this structure. The starting inefficient operation is not very desirable as a wireless telephone becomes smaller and power consumption conditions become severer.

[0014]

Therefore, the power amplification circuit which can operate efficiently on the both sides of a 800MHz system and a 1900MHz system and the both sides of an analog system and a digital system is called for by this technical field. As for the power amplifier of this dual band and a dual mode, it is desirable that the efficient solution proposal to the above-mentioned problem integrated can be offered.

[0015]

In the design of the power amplifier of an effective dual band and a dual mode, you also have to take into consideration that power consumption serves as larger concerns with the latest cellular phone. In order to reduce the physical size of the latest cellular phone, the size of the cell of a cellular phone is decreasing on three cells from four pieces or five cells. If the number of cells decreases, the energy which can be used for supplying electric power to a cellular phone will also decrease, consequently effective talk time will become short. Another effect which reduces the size of a cellular phone and the cell of the cellular phone is that the heat which diffuses from the circuit of a cellular phone operating is confined in a narrower physical field.

[0016]

Therefore, in the cellular phone of a dual band and a dual mode, the power amplifier which has the property that little power consumption is is called for.

[0017]

Outline of invention Therefore, the purpose of this invention is to offer the power amplification circuit for the radio transceiver which can amplify RF signal efficiently by the linear mode or the saturation operating mode.

[0018]

Another purpose of this invention is to offer the power amplification circuit for amplifying RF signal efficiently in two or more frequency bands or range with few current consumption.

[0019]

Another purpose of this invention is to provide the linear operating mode for amplifying a DQPSK modulating signal, or the saturation operating mode for amplifying the signal by which frequency modulation was carried out with the power amplification circuit of the dual band / dual mode which can be used as a selection target.

[0020]

The above and the other purpose are attained by the power amplification circuit which has a driver amplification stage containing low band driver amplifier and high band driver amplifier. A final amplification stage contains the TDMA amplifier for amplifying the signal by which the digital modulation was carried out, and the amplifier in saturation (non-linear) mode for amplifying the signal (analog) by which frequency modulation was carried out. A switching network and an input filtering stage combine the suitable driver amplifier for suitable final amplifier according to the operating mode which connects mutually and asks for a driver amplification stage and a final amplification stage, are either of two or more frequency bands, and can amplify an analog or a digital RF signal most effectively and efficiently.

[0021]

In order to perform impedance matching and to separate the digital signal of D-AMPS (800MHz band), and the digital signal of PCS (1900MHz band), the die PUREKUSU matching circuit is combined with the final amplifier in the linear mode, and a power impedance-matching circuit is

combined with the outgoing end of the final amplifier in saturation mode.
[0022]
An amplifying circuit includes the means for using an amplifying circuit as a selection target in the linear mode or saturation mode corresponding to the digital operating mode and analog operating mode of a wireless telephone. In a linear or digital mode, bias can be applied to this amplifier so that final linear amplifier may be made into an ON state, and it can kick in bias to this amplifier so that the amplifier in saturation mode may be made into an OFF state. Similarly, in a saturation operating mode or an analog operating mode, bias can be applied to this amplifier so that the final amplifier in saturation mode may be made into an ON state, and bias can be applied to this amplifier so that linear amplifier may be made into an OFF state.
[0023]
An amplifying circuit can include the means for combining alternatively either the outgoing end of the 1st die PUREKUSU matching circuit, or the outgoing end of a low-pass matching circuit with an output line, respectively, when this amplifying circuit is alternatively made into the linear mode or saturation mode.
[0024]
An isolator is combined with one or more outgoing ends of the low band of a die PUREKUSU matching circuit, or a high band outgoing end in the one example. [0025]
With the analog path of a low band, the duplexer for reducing RF power conditions of coupling means in the preceding paragraph of coupling means is prepared.
[0026]
In the another example, in order to improve a power loss (power dissipation), a switching network and an input filter stage are prepared in front of a dual driver amplification stage.
[0027]
Furthermore, in the another example, in order to reduce further the energy consumed vainly, separate RF power amplifier chain is formed for every operating mode.
[0028]
If the following detailed explanation is read with reference to an accompanying drawing, the above and the other purpose of this invention will become clear with the feature and advantage of this invention. In an accompanying drawing, the same reference number shows the same element.
[0029]
Detailed explanation of a desirable example Next, this invention is explained with reference to the accompanying drawing which shows the desirable example of this invention. However, this invention can be carried out with many different gestalten, and it must not be considered that it is what is limited only to the specific example shown in this specification. Rather, these desirable examples make the indication of this specification perfect, and they indicate it in order to tell this contractor the range of this invention completely.
[0030]
The terminological both sides which a "diplexer" diplexer [a "duplexer" and] Come to set to this application mean the frequency-selective splitter of three ports. Although a duplexer is used in order that it may use a common antenna and RF transceiver may enable it to transmit and receive simultaneously on the approaching frequency, another side and a diplexer divide an input signal into a high band signal or a low band signal.
[0031]
If drawing 2 is referred to first, the whole power amplification circuit of a dual band is displayed by the reference number 200. The power amplification circuit 200 has the die PUREKUSU matching circuit 205 for matching the impedance of multi-band power amplifier. A radio frequency (RF) is inputted into the RF input port 210 of the multi-band amplifier 220, and amplifier 220 amplifies RF signal and outputs amplified RF signal to the port 225 of the die PUREKUSU power matching circuit 205.
[0032]
RF signal amplified in the example shown in drawing 2 is good at either of two frequency bands. However, if it is this contractor, it will become clear easily that it can change so that this

invention can be used in relation to the power amplification circuit which can amplify RF signal included in three or more frequency bands.

[0033]

RF signal in the 1st frequency band progresses to a duplexer 235 through a filter / matching circuit 230. Similarly, RF signal in the 2nd frequency band passes through a filter / matching circuit 240, and progresses to a duplexer 245.

[0034]

A filter / matching circuit 230 blocks RF signal in the 2nd frequency band, performing suitable impedance matching to the signal in the 1st frequency band. Similarly, a filter / matching circuit 240 blocks RF signal in the 1st frequency band, performing suitable impedance matching to the signal in the 2nd frequency band.

[0035]

In order to transmit using an antenna 270, it is combined with the diplexer 260, and corresponding to communication system while using amplifier 200, in 1900MHz, according to whether full dupe REKUSU employment is required, a duplexer 235 is needed or the output duplexer 235 becomes unnecessary. Similarly, the outgoing end of a duplexer 245 is combined to the diplexer 260, in order to transmit using an antenna 270.

[0036]

The example shown in drawing 2 and its example of realization are indicated in detail by the U.S. 08th/patent application No. (the [representative reference number] EUS No. 00502) 888,168 under continuation.

[0037]

Next, reference of drawing 3 shows the whole amplifying circuit of a dual mode / dual band by the reference number 300. In order to amplify the both sides of an analog and a digital signal within two different frequency bands or range and to provide a wireless telephone with the function of a dual band and a dual mode, it is desirable to form amplifier 300 in the transmitter of a wireless telephone (not shown) or a transceiver. An amplifying circuit 300 contains the RF input port 302 combined with the mode selection switch 304. According to whether a wireless telephone is employed in digital mode, or it is applied in analog mode, an input RF signal is transmitted to either the digital path 306 or the analog path 308 by setup of the mode selection switch 304. The position of the mode selection switch 304 is controlled by the modal-control signal from the microprocessor in a wireless telephone (not shown), and the control signal sent by this microprocessor is used for choosing either a linear operating mode or a saturation (un-linear) operating mode in an amplifying circuit 300.

[0038]

The digital path 306 amplifies efficiently the signal with which this linear amplifier was modulated using linear modulation technology, for example, DQPSK modulation technology, including the linear amplifier 310. The outgoing end of the linear amplifier 310 is combined with the die PUREKUSU matching circuit 330, and this die PUREKUSU matching circuit 330 separates a 1900MHz signal from a 800MHz signal efficiently, performing impedance matching to the linear amplifier 310 in both frequency range. The structure and the function of this die PUREKUSU matching circuit 330 are explained more to a detail below.

[0039]

The die PUREKUSU matching circuit 330 has the 1900MHz outgoing end 334 and the 800MHz outgoing end 336. The 1900MHz outgoing end is combined with the diplexer 370 through the path 339, and a diplexer 370 combines a 1900MHz output signal with an analog 380. Furthermore, in CDMA or a multi-rate TDMA system, to 1900MHz employment, when it desires employment of full dupe REKUSU, a duplexer can be prepared between the 1900MHz outgoing end 334 and a diplexer 370, for example.

[0040]

The analog path 308 contains the un-linear amplifier 320 which amplifies efficiently the signal by which frequency modulation was carried out. The outgoing end of this un-linear amplifier 320 is combined with the matching circuit 340, and this matching circuit 340 performs 50-ohm impedance matching to the un-linear amplifier 320. It is useful also to this matching circuit 340

suppressing the harmonic content which may be fed back from the 1900MHz path 339.
[0041]
Since the separate linear amplifier 310 and the un-linear amplifier 320 are formed, un-linear amplifier can be operated as the amplifier of Class C saturated deeply, or amplifier of Class E of switching mode. With the old solution proposal to use single amplifier to the both sides of linear amplification and un-linear amplification, maintaining the efficiency of a non-linear, as much as possible, as large, in order to fulfill linear conditions barely, bias (AB class) had to be applied to amplifier. this invention uses this problem as a solution plug, offering the amplifying circuit which can amplify a signal effectively and efficiently by different frequency band.
[0042]
The outgoing end of the matching circuit 340 on a line 345 and the 800MHz outgoing end of the die PUREKUSU matching circuit 337 on a line 338 are prepared to the large power switch 350. This large power switch 350 combines either the 800MHz outgoing end of the die PUREKUSU matching circuit 330, or (it corresponds to the 800MHz signal of an analog) the outgoing end of the matching circuit 340 through the output line 361 (it corresponds to a digital 800MHz signal) according to whether the cellular phone is employed in whether it is applied in digital mode, and analog mode. The large power switch 350 is controlled by the modal-control signal from the microprocessor of a wireless telephone like the case where the mode selection switch 304 is used. Furthermore, since the large power switch 350 performs isolation to the linear amplifier 310, this thing is prevented for the load of the un-linear amplifier 320 and the matching circuit 340 by the linear amplifier 310.
[0043]
According to the employment mode (for example, digital mode or analog mode) for which a cellular phone asks, a DC bias is applied to the linear amplifier 310 and the un-linear amplifier 320 by switching the Vcc input edges 316 and 326 to ON and OFF.
[0044]
A duplexer 360 is the conventional duplexer which enables full dupe REKUSU employment by 800MHz. A duplexer 360 combines a 800MHz signal with a diplexer 370, and combines a diplexer 370 with an antenna 380 for transmission of a signal to a degree.
[0045]
Especially the example shown in drawing 3 is suitable for using it by the TDMA transceiver which operates by half dupe REKUSU by 1900MHz. However, it can make it possible to use this circuit easily by the TDMA transceiver of CDMA or a multi-rate by extending a duplexer on a path 339 so that employment of full dupe REKUSU may be enabled by 1900MHz as already stated.
[0046]
The same die PUREKUSU matching circuit 330 as the die PUREKUSU matching circuit 205 fundamentally shown in drawing 2 is indicated in detail by the U.S. patent application 08th under continuation / No. 888,168. The example shown in drawing 3 and its example of realization are indicated more by the U.S. patent application 08th under continuation / No. 939,870 at the detail.

[0047]
Next, reference of drawing 4 shows the whole architecture of the amplifier of the 2nd dual band / dual mode by the number 400 here. This amplifier 400 divides amplifier into a driver stage and a final stage, and improves the design shown in drawing 2 and 3 by combining a suitable driver and a final stage alternatively according to the operating mode for which amplifier 400 asks. This amplifier 400 contains the driver amplifier 402 which is 1900MHz to which it aligned with so that the signal of a 1900MHz frequency band might be amplified efficiently, and bias was applied, and the driver amplifier 412 which is 800MHz to which it aligned with so that the signal of a 800MHz frequency band might be amplified efficiently, and bias was applied.
[0048]
Amplifier 400 also contains the amplifier 404 and 414 of the final stage of a couple. Bias is applied, and although aligned, so that the amplifier 404 of a final stage may amplify efficiently RF signal by which the digital modulation was carried out, and linear operation may be carried out as amplifier of AB class The efficient operating mode for the amplifier 414 of a final stage amplifying

efficiently the analog RF signal by which frequency modulation was carried out. For example, by the amplifier of Class C in the state where it was saturated deeply, the switch mode class E amplifier, or other very efficient operating modes, bias is applied and is aligning so that saturated operation may be carried out.

[0049]

The amplifier 402 and 412 of a driver stage is connected to the amplifier 404 and 414 of a final stage by the switching network 418 including switches 422, 424, and 426. Each of switches 422, 424, and 426 can be considered as the field-effect transistor (FET) switch whose structure is common knowledge at this contractor. If it is this contractor, it can replace by the switch suitable type [other]. The switching condition of these switches 422, 424, and 426 is controllable by the control line (not shown) from a related microprocessor or other control-logic circuits (not shown).

[0050]

A switch 422 combines the outgoing end of the 1900MHz driver amplifier 402 to the input edge of the final linear amplifier 404. The outgoing end of the 800MHz driver amplifier 412 is combined with the node 428, next, through the switch 424, it is combined with the input edge of the final linear amplifier 404, and this node 428 is further combined also with the input edge of the saturated final amplifier 414 through the switch 426. The position of switches 422, 424, and 426 is controlled by the modal-control signal from the microprocessor in a radiotelephone (not shown).

[0051]

This signal is filtered according to the frequency component of a signal, the signal which the final amplifier 404 outputs passes the matching network 430 which makes it pass, and it is sent to a diplexer 460 or (minding a switch 445) a diplexer 465 (when required). As for a matching network 430, it is desirable that it is the die PUREKUSU matching circuit which is indicated by the U.S. patent application 08th under continuation / No. 888,168.

[0052]

In the one example, the 1st filter 410 is formed between the input edge of the 1900MHz driver amplifier 402, and the switch 422, and the 2nd filter 420 is formed between the outgoing ends of the driver amplifier 412 and nodes 428 which are 800MHz. These filters 410 and 420 filter an input signal in front of a final gain stage, and perform noise rejection of the receiving band of a signal, and reduction of a harmonic content. In the one example, filters 410 and 420 are surface-acoustic-wave (SAW) band pass filters to which structure is well-known at this contractor.

[0053]

By sending the filtered signal to a final amplifier stage, the final amplification by linear amplifier becomes more effective. By installing a filter between the gain stages of amplifier, the duplexers 460 and 465 with more few poles can be realized, and the insertion loss after a final amplification gain stage can be reduced, consequently a direct-current drain can be lessened. Since there are more few insertion losses of amplifier 400, a final amplifier stage does not need to generate large output RF power. Size (die size) of a die is made smaller by this, and the desirable result of a large number including the consumption of a direct current decreasing more is obtained.

[0054]

The higher-harmonic trap 455 is combined with the input edge of the die PUREKUSU matching circuit 430 in the one example. The function of the higher-harmonic trap 455 is to reduce the harmonic content of the signal outputted by the die PUREKUSU matching circuit 430, and supply VDD to the amplifier 404 of a final stage. Drawing 5 shows one example of the higher-harmonic trap 455 including the large power switch 510 combined with the parallel inductors 520 and 525 which can switch a couple.

[0055]

Next inductors 520 and 525 are combined with the capacitor 530, and this capacitor 530 is combined with the input edge of the die PUREKUSU matching circuit 430. Although an inductor 520 and a capacitor 530 constitute the parallel resonant circuit which resonates by 800MHz, another side, an inductor 525, and a capacitor 530 form the parallel resonant circuit which resonates by 1900MHz. Thus, according to the state of a switch (set up by the operating state of

amplifier 400) 510, the higher-harmonic trap 455 works so that the higher-harmonic signal in 800MHz a band or a 1900MHz band may be decreased. The switch 510 as well as switches 422, 424, and 426 is controllable by the control line (not shown) from a related microprocessor or other control logic (not shown).

[0056]

Since the linear amplifier 404 of a final operates in the mode of AB class, the harmonic content of an output signal increases more than the case where the amplifier of Class A is used. Therefore, by preparing a higher-harmonic trap in the outgoing end of the final amplifier 404, it can limit to the frequency which asks for output energy, and the efficiency of the final amplifier 404 can be raised.

[0057]

If drawing 4 is referred to again, this amplifier can operate by one of much selectable modes so that an analog or a digital signal may be amplified by the 800MHz frequency band or a digital signal may be amplified by the 1900MHz frequency band. In order to consider as a 1900MHz operating mode, a switch 422 is closed and a switch 424 is opened. In a 1900 moreMHz operating mode, in order to isolate the amplifier 404 and 414 of a final stage further, a switch 426 can be opened. Through the input terminal 405, the input signal to which the digital modulation of [in a 1900MHz frequency band] was carried out is inputted into amplifier 400, and is sent to the 1900MHz driver amplifier 402. The signal which the 1900MHz driver amplifier 402 outputs is sent to the input edge of the final amplifier 404. The bias for operating in the linear mode as mentioned above is applied to the final amplifier 404. Amplifier 404 amplifies efficiently the signal by which the digital modulation was carried out, and outputs the amplified signal to the die PUREKUSU matching circuit 430.

[0058]

In order to amplify the analog RF signal in a 800MHz band, switches (800MHz analog mode) 422 and 424 are opened, and, on the other hand, a switch 426 is closed. Through the input terminal 415, the input signal, for example, an analog, i.e., FM, in a 800MHz frequency band by which frequency modulation was carried out is inputted into amplifier 400, and is inputted into the 800MHz driver amplifier 412. The signal which this 800MHz driver amplifier 412 outputs is sent to the input edge of the final amplifier 414 through the closed switch 426. Since the bias for operating in saturation mode is applied to the final amplifier 414, this amplifier amplifies FM signal efficiently and outputs the amplified signal to the matching circuit 440.

[0059]

In order to amplify RF (for example, pai-fourth Differential QPSK) signal with which the digital modulation of [in a 800MHz band] was carried out, switches (800MHz digital mode) 422 and 426 are opened, and another side and a switch 424 are closed. Through the input terminal 415, the input signal to which the digital modulation of [in a 800MHz frequency band] was carried out is inputted into amplifier 400, and is inputted into the 800MHz driver amplifier 412. The signal which the 800MHz driver amplifier 412 outputs is sent to the input edge of the final amplifier 404 through a node 428 and a switch 426. As mentioned above, the bias for the final amplifier 404 operating in the linear mode is applied. Amplifier 404 amplifies efficiently the signal by which the digital modulation was carried out, and outputs the amplified signal to the die PUREKUSU matching circuit 430. Operation of a switch 445 is similar to operation of the switch 350 explained with reference to drawing 3 .

[0060]

As mentioned above, in the newest cellular phone, power consumption serves as more serious concerns. In order to reduce the physical size of the newest cellular phone, the size of the dc-battery of a cellular phone is decreasing in three cells from four pieces to five cells. If the number of cells decreases, the energy which can be used for supplying electric power to a cellular phone will also decrease, consequently the length of effective talk time will also become short. furthermore, it is mentioned that the heat with which the circuit of a cellular phone operates and by which thing shell discharge is carried out is shut up by narrower physical area as another effect which reduced the size of a cellular phone and its dc-battery Therefore, it is very desirable to make into the minimum the amount of energy consumed by the sending circuit.

[0061]
In order to explain the dissipation effect of the power in the power amplifier of a dual band and a dual mode, the transmitter chain of the well-known dual band again shown in drawing 1 is mentioned. The joint network 420 of the voltage which has a power burst size equal to L, and is supplied to amplifier 106 is equal to V, the power outputted from the amplifier 105 combined with the antenna 180 in fact is equal to P0, and the efficiency of amplifier 105 can write the current sent to amplifier 105 from a power supply with the following equation, when it is assumed that it is E.
[0062]
[Equation 1]
(1) I=(P0andL)/(E-V)
[0063]
That is, the power in the outgoing end of amplifier 105 is equal to (P0andL). If the difference of the power which amplifier 105 outputs, and the power supplied is displayed as the dissipation power Pd, this difference can be written as follows.
[0064]
[Equation 2]
(2) Pd=Ps-P0andL [0065]
Next, a formula (2) can be rewritten as follows.
[0066]
[Equation 3]
(3) Pd=(V-I)-P0 and L [0067]
An equation (1) can be used and an equation (3) can be rewritten as follows.
[0068]
[Equation 4]
(4) Pd=(1-/E-I) -P0andL [0069]
By reducing the loss L of a joint network from an equation (1) and (4), the current which power amplifier absorbs is reduced and the power consumed in a circuit and the dissipating heating value can also be reduced.
[0070]
A predetermined dual mode and the cellular phone of a dual band do not need to operate in full dupe REKUSU mode in digital mode by one of frequency bands. For example, in the dual mode which supports the global system for information-separator-136, i.e., a mobile communications (GSM) plan, and the cellular phone of a dual band, digital communications are performed using half dupe REKUSU mode. Therefore, only one duplexer is required of a 800MHz analog path in this system. Since loss is a quite large device (2-3dB), if a duplexer is omitted from a digital path, the consumption of the power in this circuit of a duplexer will decrease sharply.
[0071]
One example of this invention which shows that the duplexer was removed from the digital path is shown in drawing 6 . In the amplifying circuit 600 shown in drawing 6 , the duplexer prepared in the 1900MHz outgoing end of the die PUREKUSU matching circuit 430 is omitted, and the circulator 610 is used instead. This circulator 610 is for sending the signal which the 1900MHz matching circuit of the die PUREKUSU matching circuit 430 outputs to a diplexer 470. The 800MHz outgoing end of this die PUREKUSU matching circuit 430 is combined with the isolator 620, and, next, this isolator is combined with the large power switch 630. The outgoing end of a circulator 610 is combined with the diplexer 470 through output line 640A, and the outgoing end of the large power switch 630 is combined with the diplexer 470 through output line 640B. Since there is less loss than a duplexer consequently, as for an isolator 620, efficiency is improved by employment in the 800MHz linear mode.
[0072]
"Circulator" The becoming term can understand that the isolator of a specific type, for example, structure, means the 3 port type device which is well-known at this contractor. Therefore, it can be understood that the term an "isolator" isolator of a wide sense Becoming also contains a circulator in this contractor.

[0073]
Since the duplexer is unnecessary, the duplexer 645 which separates the sending signal and input signal in a 800MHz band is moved to 800MHz linear half dupe REKUSU employment by the input side of the large power switch 630 in a 800MHz saturation (analog) path. Consequently, RF power conditions of the large power switch 630 will be good for becoming low and therefore realizing by ASIC in narrow physical space. Since the performance in 800MHz saturation mode and the 1900MHz linear mode is not influenced by this change consequently, in the 800MHz linear mode, about 100MHz saving of it should be attained.
[0074]
In the example shown in drawing 6 , final linear amplifier is replaced by the TDMA final amplifier for amplifying the TDMA signal in 800MHz and a 1900MHz band.
[0075]
Besides having stated until now, operation of an amplifying circuit 600 is the same as that of operation explained in relation to the example shown in drawing 4 .
[0076]
Another example of this invention is shown in drawing 7 as a circuit 700. In the example shown in this drawing, the FET switching network 725 and the filter relevant to the linear mode are moved to the upstream to the example of drawing 6 . Although 1900MHz RF input edge 405 is combined with the direct filter 710, another side and 800MHz RF input edge 415 are combined with the direct filter 720.
[0077]
The FET switching network 725 includes switches 722, 724, and 726. The switch 722 is combined between the outgoing end of a filter 710, and the input edge of the TDMA driver 702, the switch 724 is combined between the node 728 and the input edge of the TDMA driver 702, and another side and the switch 726 are combined between the node 728 and the input edge of the 800MHz driver 712. The outgoing end of a filter 720 is combined with the node 728, and the position of switches 722, 724, and 726 is controlled by the microprocessor (not shown) modal-control signal in a radiotelephone.
[0078]
Like the example shown in drawing 4 , amplifier can operate by one of much selectable modes so that the analog in a 800MHz frequency band, a digital signal, or the digital signal in a 1900MHz frequency band may be amplified. In order to become a 1900MHz operating mode, a switch 722 is closed and can open another side and a switch 724. The input signal to which the digital modulation of [in a 1900MHz frequency band] was carried out is inputted through the input terminal 405, and is sent to a filter 710. The signal which a filter 710 outputs is combined through the switch 722 to the input edge of the TDMA driver amplifier 702. The output signal of the TDMA driver 702 is sent to the TDMA final amplifier 604. This final amplifier 604 amplifies efficiently the signal by which the digital modulation was carried out, and outputs the amplified signal to the die PUREKUSU matching circuit 430.
[0079]
In order to amplify the analog RF signal in a 800MHz band, the switches 722 and 724 in (800MHz analog mode) can be opened, and another side and a switch 726 are closed. Through the input terminal 415, the input signal (for example, an analog or FM) to which frequency modulation of [in a 800MHz frequency band] was carried out is inputted into amplifier 700, and is sent to a filter 720. The signal which a filter 720 outputs is sent to the input edge of the 800MHz driver amplifier 712 through the switch 726 closed. The 2nd filter 704 is combined with the outgoing end of the 800MHz driver amplifier 712, and the outgoing end of the final amplifier 414.
[0080]
The bias for operating in saturation mode is applied to the final amplifier 414, therefore this final amplifier amplifies FM signal efficiently, and the amplified signal is outputted to the matching circuit 440.
[0081]
In order to amplify RF (for example, pai-fourth Differential QPSK) signal with which the digital modulation of [in a 800MHz band] was carried out, switches (800MHz digital mode) 722 and 726

can be opened, and another side and a switch 724 are closed. Through the input terminal 415, the input signal to which the digital modulation of [in a 800MHz band] was carried out is inputted into amplifier 700, and is sent to a filter 720. The signal which a filter 720 outputs is sent to the input edge of the TDMA driver 702 through a node 728 and a switch 724. The signal from the TDMA driver amplifier 702 is given to the TDMA final amplifier 604. As mentioned above, the bias for operating in the linear mode is applied to the final amplifier 604. Amplifier 604 outputs the signal by which amplification width of face was carried out in the digital signal to the die PUREKUSU matching circuit 430.

[0082]

Two targets are attained by moving finals 710 and 712 and the switching network 725 to the front upstream of the driver amplifier 702 and 712. That is, the current consumed in filters 710 and 712 and the switching network 725 by the 1st is reduced. The reason is that current conditions are reduced since loss of power arises in low power level more consequently. RF power which must be processed [2nd] with switches 722, 724, and 726 is reduced, and the area of a transistor required for this to realize a switch contracts.

[0083]

It is desirable to form one RF power amplifier chain for every band of operation in the case where it has the power conditions from which the low band (800MHz) mode and high band (1900MHz) mode of TDMA differ sharply. An example of this amplifier is shown in drawing 8 . The power amplification circuit 800 has the high band input terminal 705 and the low band input terminal 715. The high band signal inputted into the terminal 705 passes a filter 710, and is sent to the TDMA driver 806 and the TDMA final amplifier 825. Higher-harmonic trap 840A is prepared in the outgoing end of the TDMA final amplifier 825, and the 1900MHz matching circuit is established in the outgoing end of the TDMA final amplifier 825 so that the impedance of an output signal may be matched. Next, the amplified 1900MHz output signal passes a circulator 610, is sent to a diplexer 470, and is transmitted through an antenna 480.

[0084]

The low band signal inputted into the terminal 715 passes a filter 720, and is sent to a mode selection switching network including switches 822 and 824. In order to carry out TDMA employment, a switch 822 is closed and can open another side and a switch 824. Therefore, in TDMA employment, a low band input signal is sent to the TDMA final amplifier 830 through the TDMA driver 802, and a signal is amplified here for transmission. 800MHz matching circuit 855A is prepared in the outgoing end of the TDMA final amplifier 830, and higher-harmonic trap 840B is prepared in the outgoing end of the TDMA final amplifier 830. The signal sent from matching circuit 855A passes an isolator 620 and the large power switch 630, is sent to a diplexer 470, and is transmitted from an antenna 480.

[0085]

For analog employment, a switch 822 can be opened, a switch 824 is closed and, therefore, the low band analog amplifier chain containing the 800MHz driver 812, a filter 804, the saturated final amplifier 835, and 800MHz matching circuit 855B is passed by the input signal. Higher-harmonic transistor 840C is combined with the outgoing end of the final saturation mode amplifier 835. You may realize the higher-harmonic traps 840A, 840B, and 840C as a parallel resonant circuit as shown in drawing 11 . The function of these higher-harmonics traps 840A, 840B, and 840C is similar to the function which explained the higher-harmonic trap 455 with reference to drawing 4 . That is, it is reducing the harmonic content of the signal which the matching circuits' 850, 855A, and 855B output, and supplying VDD to the amplifier 825, 830, and 835 of a final stage.

[0086]

Since the separate high band TDMA amplifier chain and the TDMA amplifier chain of a low band are formed, a die PUREKUSU matching circuit which is prepared in other examples is unnecessary. As compared with other examples, the example of drawing 8 makes the performance of each final amplifier the maximum by making the optimal the insertion loss to each operating mode. As a result of making the optimal the design of the power conditions in each operating mode, mold size, cost, and a power consumption property are the optimal. Therefore, power consumption and heat loss serve as the minimum by having made into the minimum loss

which can be put on each output stage. In respect of space, although it is not ideal, such composition is very useful, although the amount of the energy consumed in a circuit is made into the minimum, when a sufficient room can be used.

[0087]

Drawing 9 shows another modification of this invention which inserted the isolator 910 of low loss between the 800MHz matching circuit 920 and the diplexer 465. By having extended the low loss isolator 910, the load to power matching of the final saturation mode amplifier 414 is fixed, and the efficiency of amplifier 414 serves as the maximum by this.

[0088]

The antenna structure 960 containing two or more Antennas 970A and 970B and related antenna electric supply points 950A and 950B is used for drawing 10 , and a diplexer shows still more nearly another abridged modification of this invention. By having omitted the diplexer, the loss relevant to the diplexer is lost, the efficiency of a power amplification circuit is raised further, and power consumption can be reduced.

[0089]

Although this invention was explained with reference to the desirable example above, if it is this contractor, you can understand that indicate this invention on these specifications and it is not limited only to the illustrated specific example. Without deviating from the summary of this invention, i.e., the range, it will be shown in this specification, and explanation of an old specification and a drawing will suggest suitably the modification of not only a different example and the example of adaptation except having explained but a large number, the example of change, and equal structure, and will become clear from these explanation and a drawing. Therefore, this invention is limited by only a claim and its summary.

[Brief Description of the Drawings]

[Drawing 1]

It is the schematic drawing of the dual amplifier chain structure known for this technical field.

[Drawing 2]

It is the schematic drawing of the single amplifier chain equipped with the die PUREKUSU power matching circuit for performing dual band employment.

[Drawing 3]

It is the schematic drawing of the amplifier chain of a dual band and a dual mode.

[Drawing 4]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

[Drawing 5]

It is the circuit diagram of the higher-harmonic trap for using it with the example of drawing 4 .

[Drawing 6]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

[Drawing 7]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

[Drawing 8]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

[Drawing 9]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

[Drawing 10]

It is the schematic drawing of example with the another amplifier chain of a dual band and a dual mode.

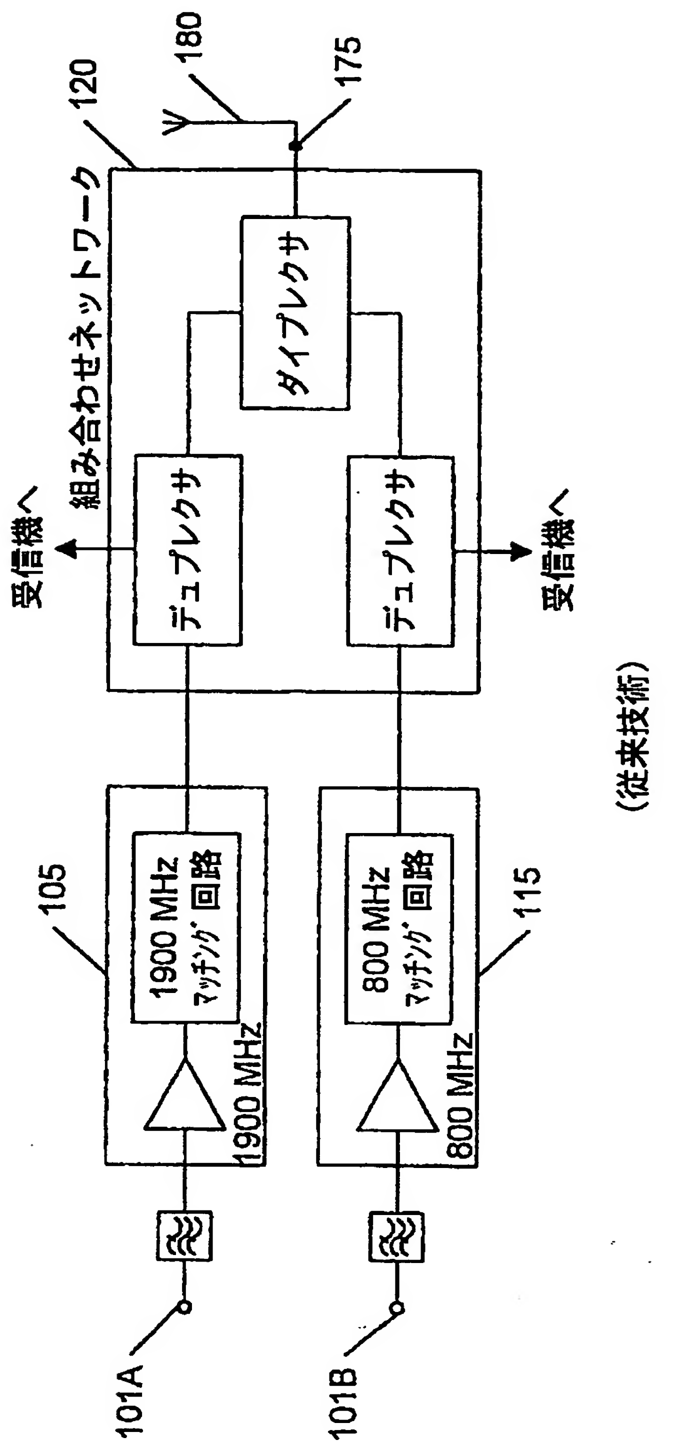
[Drawing 11]

It is the circuit diagram of the higher-harmonic trap for using it with the example of drawing 8 .

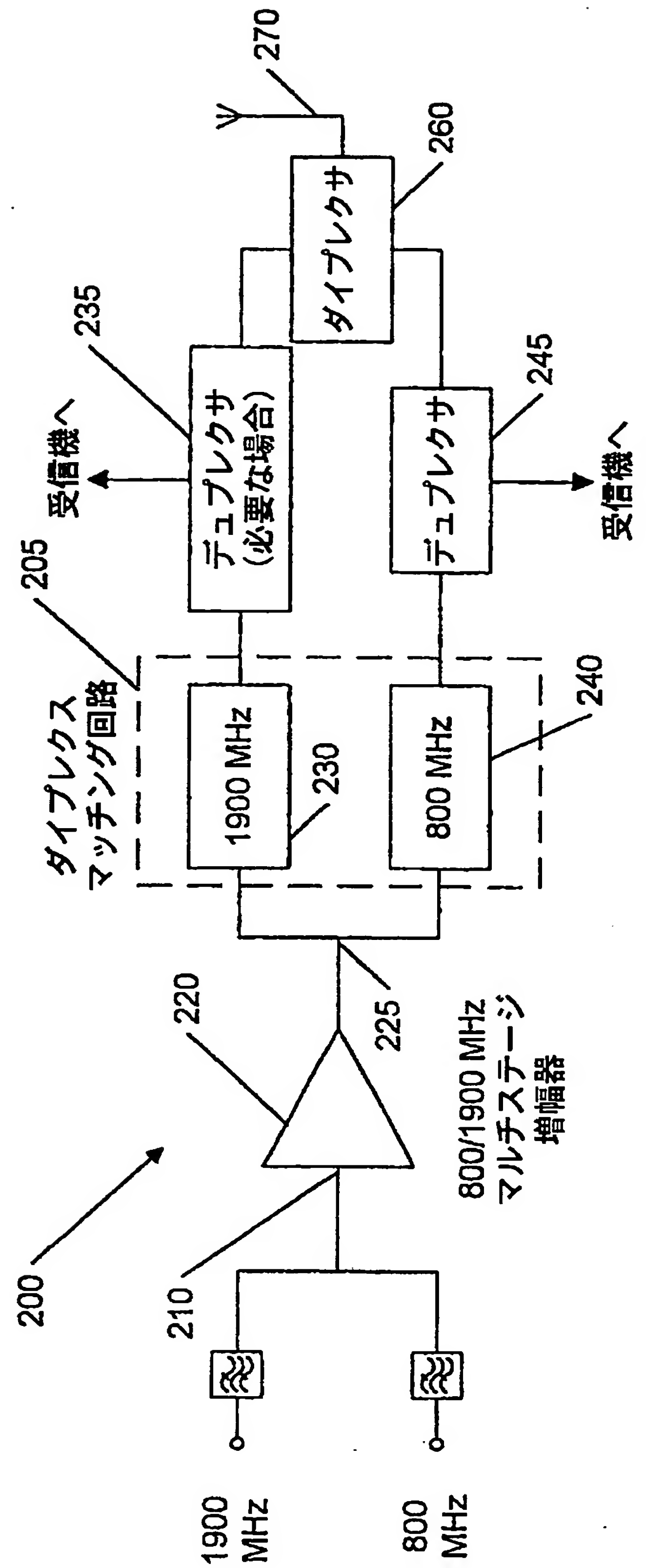
[Translation done.]

DRAWINGS

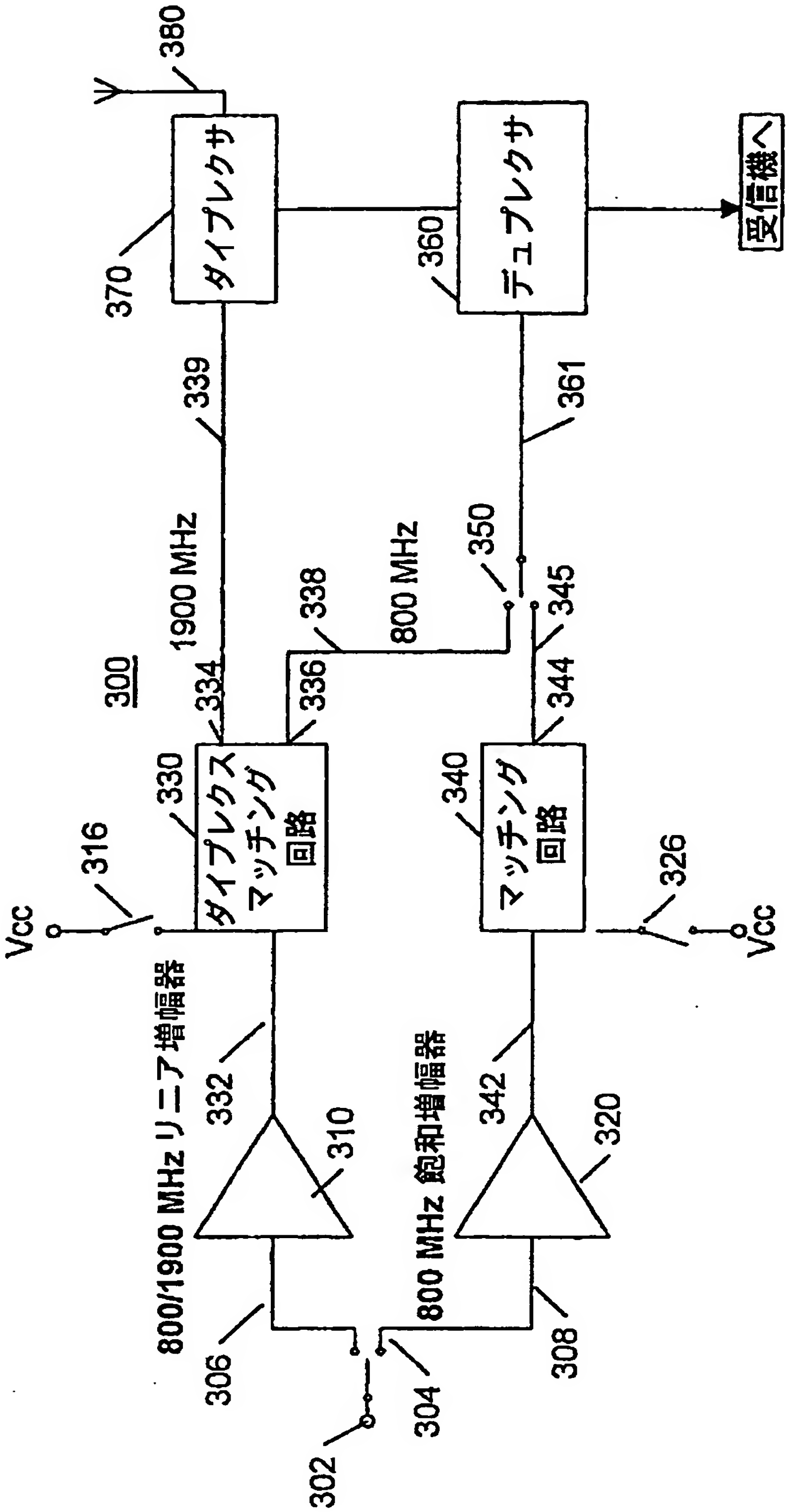
[Drawing 1]


120
180
175
組み合わせネットワーク
ダイプレクサ
デュプレクサ
デュプレクサ
受信機へ
受信機へ
105
1900 MHz
マッチング 回路
1900 MHz
115
800 MHz
マッチング 回路
800 MHz
101A
101B
(従来技術)

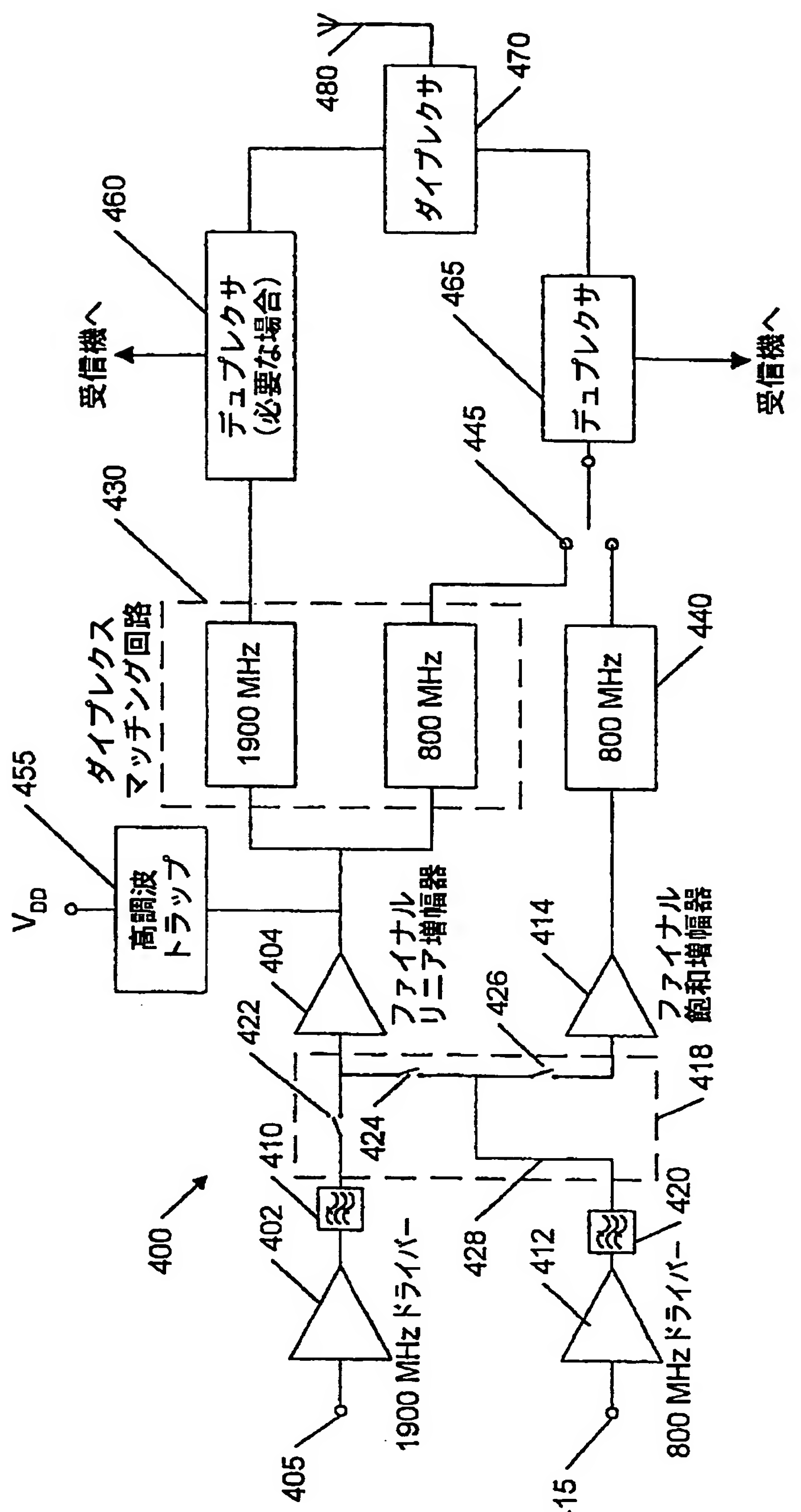
[Drawing 2]


200
210
220
225
800/1900 MHz
マルチステージ
増幅器
205
ダイプレクス
マッチング回路
1900 MHz
230
800 MHz
240
デュプレクサ
(必要な場合)
235
受信機へ
デュプレクサ
245
受信機へ
ダイプレクサ
260
270
1900
MHz
800
MHz

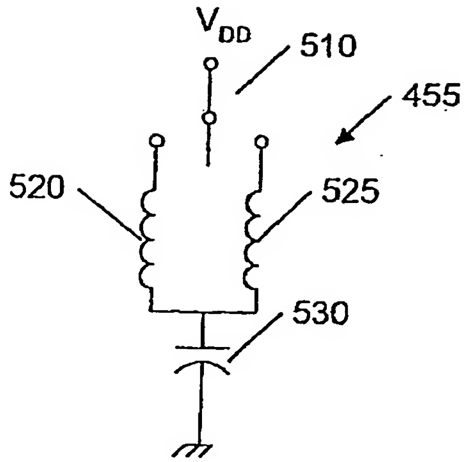
[Drawing 3]


300
Vcc
316
330
ダイプレクス
マッチング
回路
334
336
1900 MHz
338
800 MHz
339
370
ダイプレクサ
380
360
デュプレクサ
受信機へ
361
350
345
344
340
マッチング
回路
326
Vcc
332
310
800/1900 MHz リニア増幅器
342
320
800 MHz 飽和増幅器
306
304
308
302

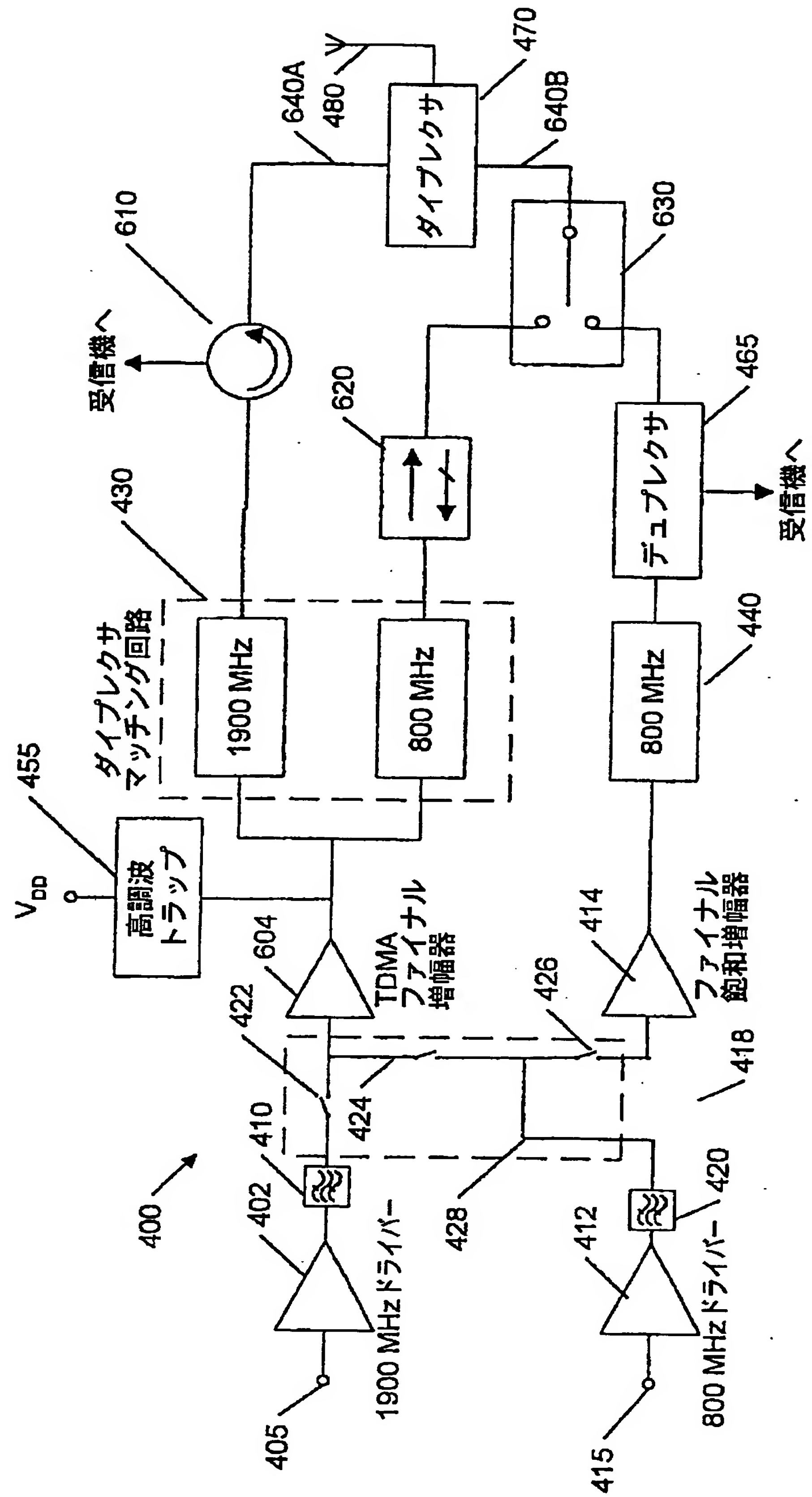
[Drawing 4]


400
405
402
1900 MHz ドライバー
410
422
424
404
ファイナル
リニア増幅器
V_DD
455
高調波
トラップ
ダイプレクス
マッチング回路
430
1900 MHz
800 MHz
460
デュプレクサ
(必要な場合)
受信機へ
480
470
ダイプレクサ
445
465
デュプレクサ
受信機へ
440
800 MHz
414
ファイナル
飽和増幅器
426
418
428
412
420
800 MHz ドライバー
415

[Drawing 5]

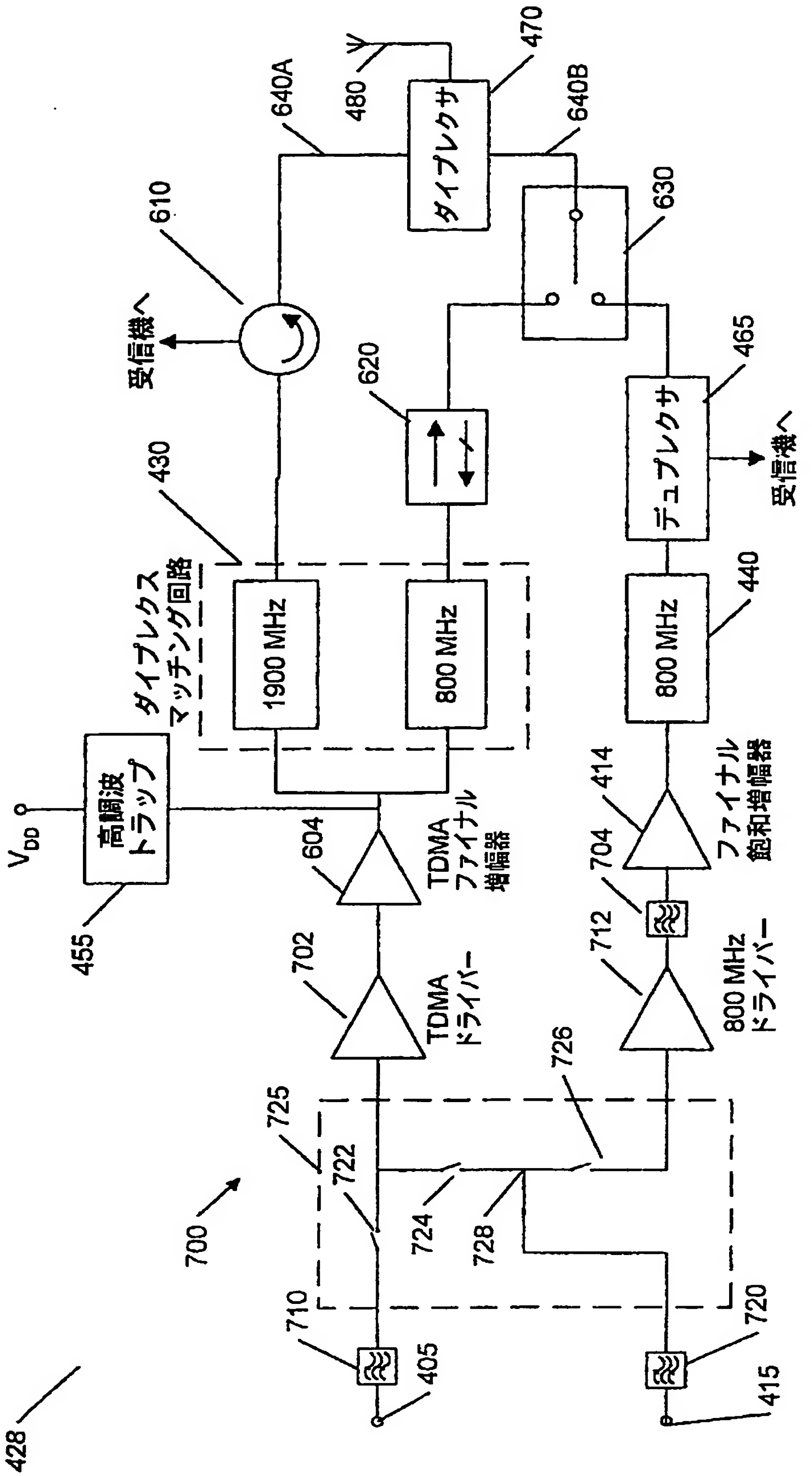


[Drawing 6]



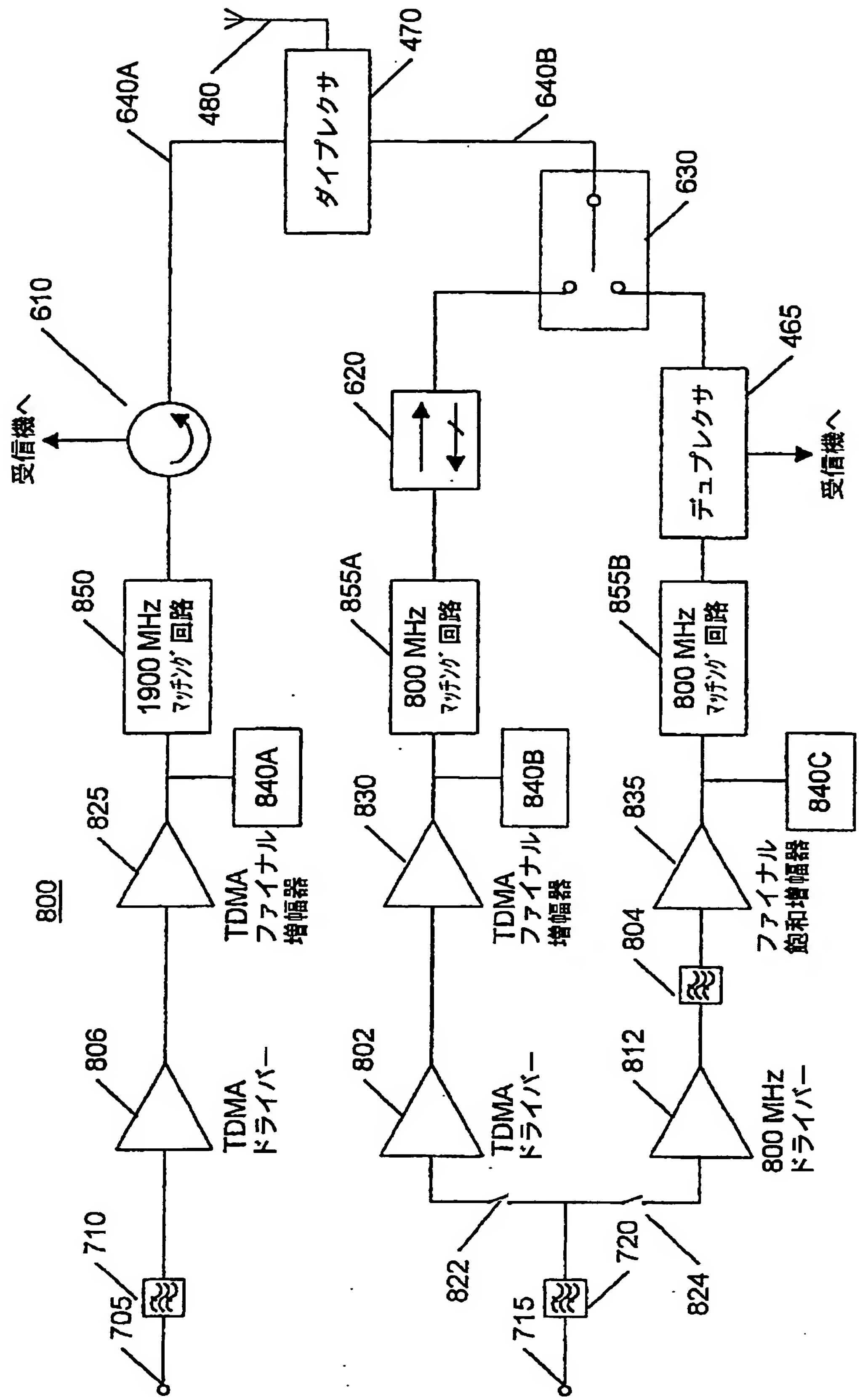
受信機へ
610
640A
480
470
ダイプレクサ
640B
630
620
465
デュプレクサ
受信機へ
430
ダイプレクサ
マッチング回路
1900 MHz
800 MHz
800 MHz
440
455
V_DD
高調波
トラップ
604
TDMA
ファイナル
増幅器
414
ファイナル
飽和増幅器
422
426
424
418
410
400
402
428
412
420
1900 MHzドライバー
800 MHzドライバー
405
415

[Drawing 7]

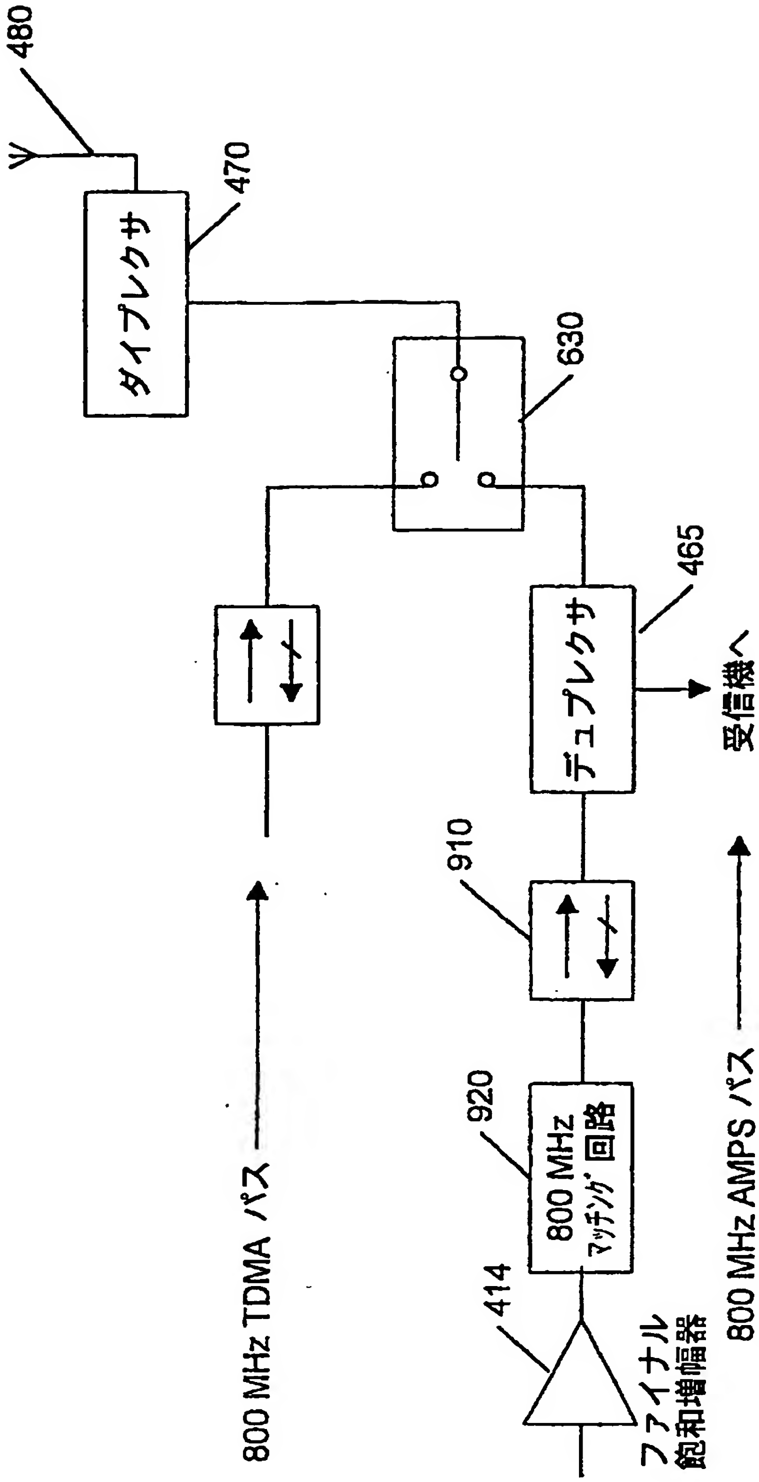


V_DD
高調波
トラップ
455
ダイプレクス
マッチング回路
430
1900 MHz
800 MHz
610
受信機へ
640A
480
ダイプレクサ
470
640B
630
620
デュプレクサ
465
受信機へ
800 MHz
440
414
ファイナル
飽和増幅器
604
TDMA
ファイナル
増幅器
702
TDMA
ドライバー
704
712
800 MHz
ドライバー
726
725
722
724
728
700
710
405
720
415
428

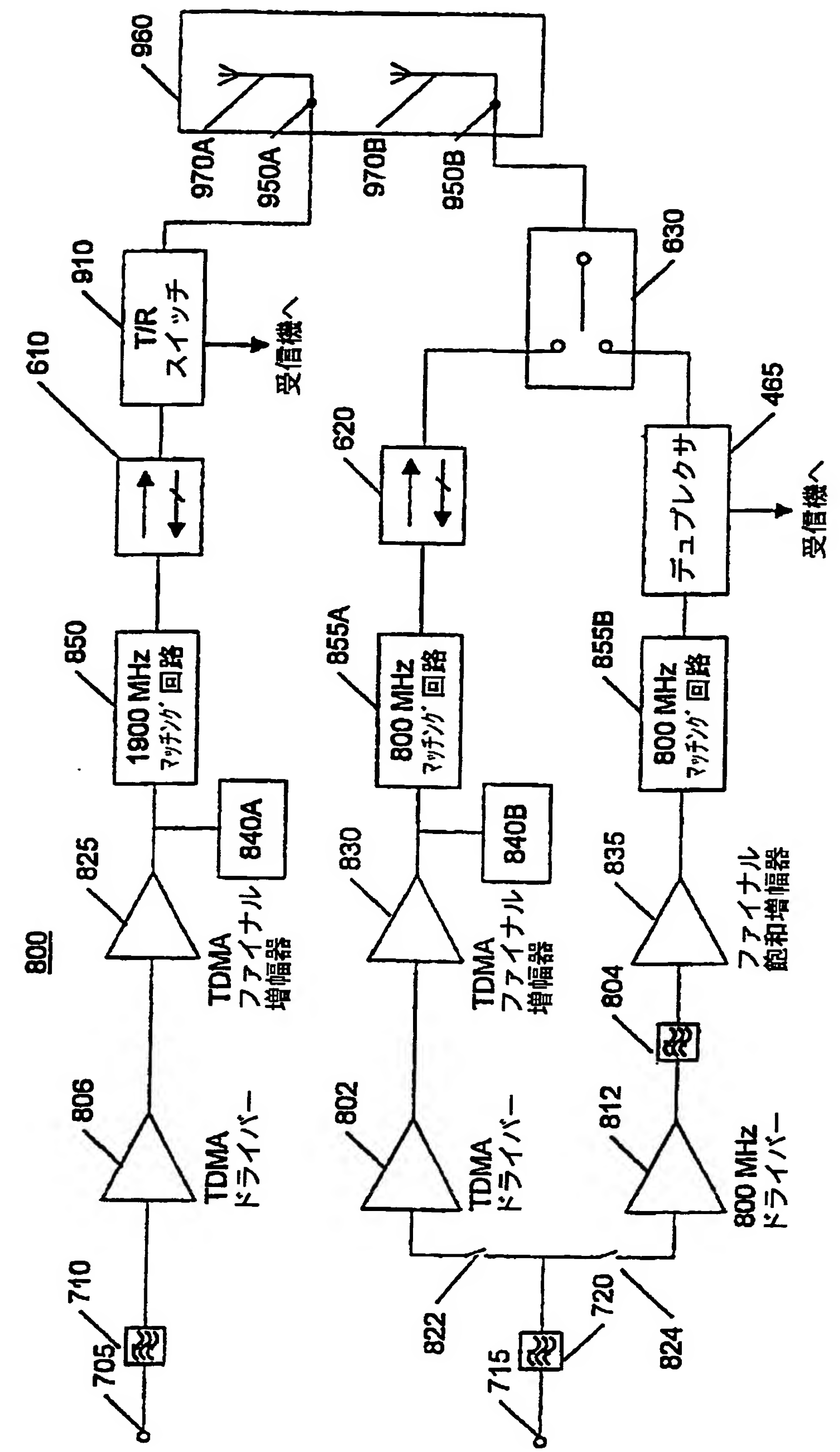
[Drawing 8]


800
705
710
715
720
822
824
TDMA
ドライバー
806
802
TDMA
ドライバー
812
800 MHz
ドライバー
804
825
TDMA
ファイナル
増幅器
830
TDMA
ファイナル
増幅器
835
ファイナル
飽和増幅器
840A
840B
840C
850
1900 MHz
ﾏｯﾁﾝｸﾞ 回路
855A
800 MHz
ﾏｯﾁﾝｸﾞ 回路
855B
800 MHz
ﾏｯﾁﾝｸﾞ 回路
610
受信機へ
620
465
デュプレクサ
受信機へ
630
640A
640B
480
470
ダイプレクサ

[Drawing 9]

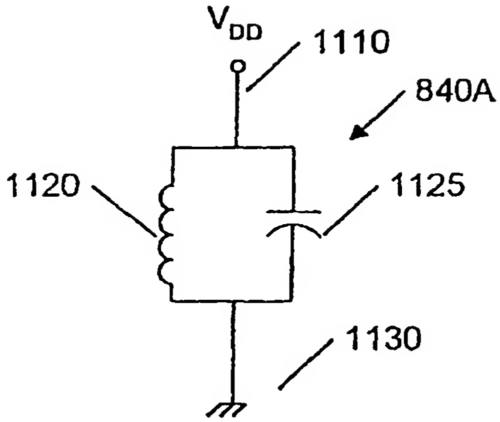

480
470
ダイプレクサ
630
465
デュプレクサ
受信機へ
910
920
800 MHz
マッチング 回路
414
ファイナル
飽和増幅器
800 MHz TDMA パス
800 MHz AMPS パス

[Drawing 10]



800
960
970A
950A
970B
950B
910
T/R
スイッチ
受信機へ
610
630
620
465
デュプレクサ
受信機へ
850
1900 MHz
ﾏｯﾁﾝｸﾞ 回路
855A
800 MHz
ﾏｯﾁﾝｸﾞ 回路
855B
800 MHz
ﾏｯﾁﾝｸﾞ 回路
840A
840B
825
TDMA
ファイナル
増幅器
830
TDMA
ファイナル
増幅器
835
ファイナル
飽和増幅器
804
806
TDMA
ドライバー
802
TDMA
ドライバー
812
800 MHz
ドライバー
710
705
822
720
715
824

[Drawing 11]



[Translation done.]